PATENT
Case No. 1060

Sub a3

1. A method of producing EMD having a high discharge capacity at high discharge rates by electrolysis in an electrolytic cell having cathodic and anodic electrodes disposed therein comprising the steps of:

maintaining a heated aqueous electrolyte solution comprising sulfuric acid and manganese sulfate in said electrolytic cell, said solution having manganese sulfate therein in an amount whereby manganese ion is present in the range of from about 5 to about 50 grams of manganese ion per liter of solution; and

applying electric current to said electrodes whereby said anodic electrode current density is in the range of from about 2.5 to about 6 amperes per square foot and said high discharge capacity EMD produced is deposited on said anodic electrode.

2. The method of claim 1 wherein said aqueous solution is maintained in said electrolytic cell at a temperature in the range of from about 95°C to about 98°C.

3. The method of claim 1 wherein said aqueous electrolyte solution has a sulfuric acid concentration therein in an amount in the range of from about 20 to about 60 grams of sulfuric acid per liter of solution.

4. The method of claim 1 wherein the amount of sulfuric acid in said electrolyte solution is greater than or equal to two times the amount of manganese ion therein.

5. The method of claim 1 wherein said cathodic electrode is comprised of copper.

6. The method of claim 1 wherein said anodic electrode is comprised of titanium.

7. A method of producing EMD having a high discharge capacity at high discharge rates by electrolysis in an electrolytic cell having cathodic and anodic electrodes disposed therein comprising the steps of:

maintaining an aqueous electrolyte solution comprised of sulfuric acid and manganese sulfate in said electrolytic cell at a temperature in the range of from about 95°C to about 98°C, said solution having sulfuric acid therein in an amount in the range of from about 20 to about 60 grams of sulfuric acid per liter of solution and having manganese sulfate therein in an amount whereby manganese ion is present in the range of from about 5 to about 50 grams of manganese per liter of solution; and

applying electric current to said electrodes whereby said anodic electrode current density is in the range of from about 2.5 to about 4.5 amperes per square foot and said high discharge capacity EMD produced is deposited on said anodic electrode.

8. The method of claim 7 wherein the amount of sulfuric acid in said electrolyte solution is greater than or equal to two times the amount of manganese ion therein.

9. The method of claim 7 wherein the cathodic electrode is comprised of copper.

10. The method of claim 7 wherein said anodic electrode is comprised of titanium.

11. A method of producing EMD having a high discharge capacity at high discharge rates by electrolysis in an electrolytic cell having cathodic and anodic electrodes disposed therein comprising the steps of:

maintaining an aqueous electrolyte solution comprised of sulfuric acid and manganese sulfate in said electrolytic cell at a temperature in the range of from about 95°C to about 98°C, said solution having sulfuric acid therein in an amount in the range of from about 25 to about 40 grams of sulfuric acid per liter of solution, having manganese sulfate therein in an amount wherein ~~whereby~~ manganese ion is present in the range of from about 5 to about 15 grams of manganese ion per liter of solution, the amount of sulfuric acid in said electrolyte solution being greater than or equal to two times the amount of manganese ion therein; and

applying electric current to said electrodes whereby said anodic electrode current density is in the range of from about 2.5 to about 3.5 amperes per square foot and said high discharge capacity EMD produced is deposited on said anodic electrode.

12. The method of claim 11 wherein said cathodic electrode is comprised of copper.

13. The method of claim 11 wherein said anodic electrode is comprised of titanium.

14. EMD having a high discharge capacity at high discharge rates produced in accordance with the method of claim 1.

15. EMD having a high discharge capacity at high discharge rates produced in accordance with the method of claim 7.

16. EMD having a high discharge capacity at high discharge rates produced in accordance with the method of claim 11.

17. An improved cathode material comprising EMD having an AA-cell discharge capacity at a 1 watt discharge rate of about 68.2 milliampere hours per gram or higher and an AA-cell discharge energy at a 1 watt discharge rate of about 755 milliwatt hours or higher.

18. An improved cathode material comprising EMD having an intrinsic discharge capacity of about 254.6 milliampere hours per gram or higher.

19. An improved cathode material comprising EMD having an initial open circuit voltage of about 1.639 volts or higher.

20. An improved cathode material comprising EMD having a compressed density of about 3.162 grams per cubic centimeter or higher.